Council on Postsecondary Education
July 30, 2001

Kentucky Space Model: Research Space Guidelines

Action: The staff recommends that the council approve the revised space planning guidelines for the research component of the Kentucky Space Needs Model and that the council use the revised Kentucky Space Needs Model to evaluate the need for new or renovated space at the public universities and colleges.

The council used the Kentucky Space Needs Model to evaluate the need for new or renovated space at the public colleges and universities for the 2000-02 capital projects recommendation. Following the 2000 session of the General Assembly, the Strategic Committee on Postsecondary Education reviewed the postsecondary education funding processes. The result of the review was a set of *Points of Consensus* for the 2002-04 operating and capital requests. The council endorsed the *Points of Consensus* February 5, 2001. Accordingly, the space needs model is to be reviewed in the areas of research space and quality of space, including fitness for purpose.

As a critical part of the reform effort, the University of Kentucky and the University of Louisville are to increase research productivity, which, in turn, will enhance the Commonwealth's economy. In order to effectively evaluate the need for research space at the two doctoral institutions, the council asked Mr. Dan Paulien, President, Paulien & Associates, Inc. of Denver, Colorado, to review the research space component of the Kentucky Space Needs Model. Mr. Paulien spent a day at each of the two doctoral universities, meeting with campus officials involved with research and visiting with leading researchers. Currently, the research lab space needs are based on research expenditure data reported to the Integrated Postsecondary Education Data System. The IPEDS data does not segregate internal and external funds. As UK and UofL increasingly stress research, Mr. Paulien recommends that the National Science Foundation data is a more suitable guide to determine their research space needs. The NSF, however, allows institutions to count unreimbursed indirect costs as institutional research and development expenditures. These costs are not included in the IPEDS reports.

As shown on pages 87 and 88, the percentage of reported institutional funds expended on research activities varies greatly for both UK and UofL, compared to their respective benchmark institutions. A review of the 1999 NSF reports reveals that UofL's percentage of institutional research and development expenditures exceeds all of their benchmark institutions. In addition, UK's percentage of institutional research and development expenditures exceeds all but one of their benchmark institutions. The variations are the result of different reporting practices related to unreimbursed indirect cost reimbursements as well as differing institutional philosophy regarding funding research. The consultant recommends that externally funded research, as reported to NSF, should be used to determine the research lab space needed by UK and UofL.

Mr. Paulien presented his recommendations to the council for discussion at the May 21 meeting. He recommended that 900 assignable square feet per $100,000 of non-institutional R&D expenditures, as reported in the NSF survey, be used for the first $50 million of research expenditures. For expenditures between $50 million and $100 million, 600 assignable square feet per $100,000 should be used. And, 300 assignable square feet per $100,000 should be used for all dollars beyond $100 million. Following the discussion at the May 21 meeting, Mr. Paulien increased the model to 350 assignable square feet per $100,000 for all dollars beyond $100 million. (The final report is presented on pages 89 to 94.)

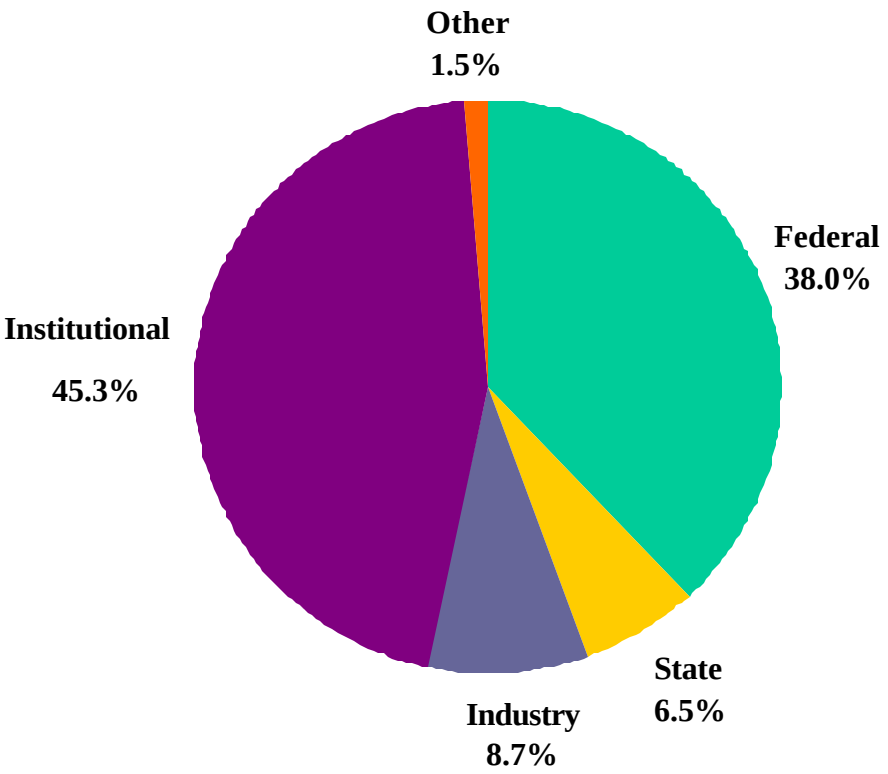
The staff has discussed the proposed revisions to the model with the chief budget officers, the executive branch, and the Legislative Research Commission staff. Related to the use of the Kentucky Space Needs Model, council staff has contracted with a consulting architect, Mr. David C. Banks, of David C. Banks, Architects and Associates, P.S.C., Frankfort, Kentucky, to perform reviews of the quality of existing space, including fitness for purpose.

The council staff will submit statewide capital project priorities for inclusion in the Statewide Capital Plan at the August meeting of the Capital Planning Advisory Board. The proposed statewide capital priorities are discussed on pages 111 and 112 . The council is to submit the 2002-04 capital budget recommendation to the Governor's Office of Policy and Management by November 15, 2001.

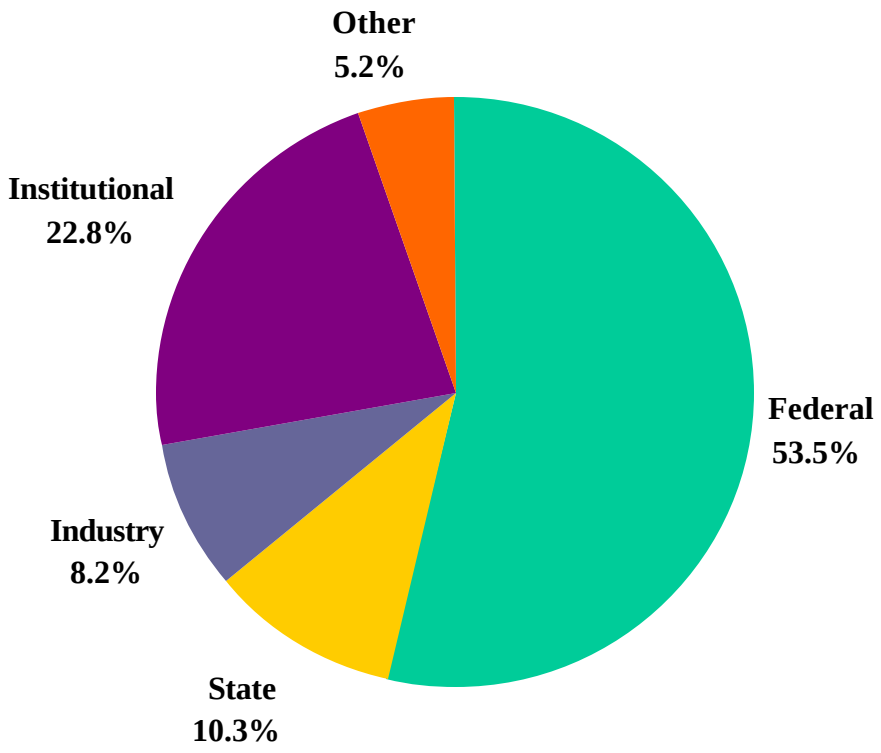
Staff preparation by Sherron Jackson

1999 Research & Development Expenditures by Source of Funds

University of Kentucky



UK Benchmark Institutions

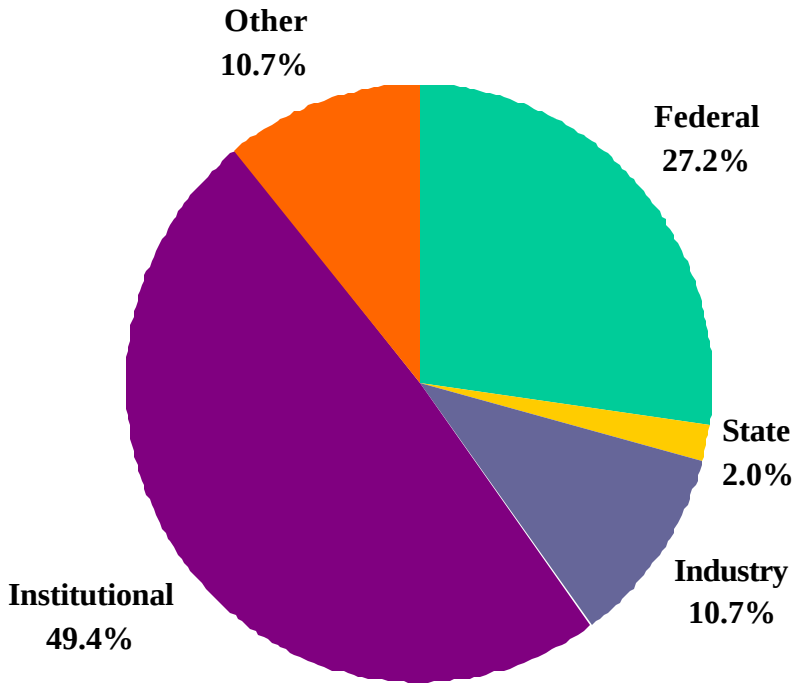


Institutional funds include:	External funds include:
• Institutionally financed organized research • Unreimbursed indirect costs and related sponsored research	• Federal • State and local • Industry • Other

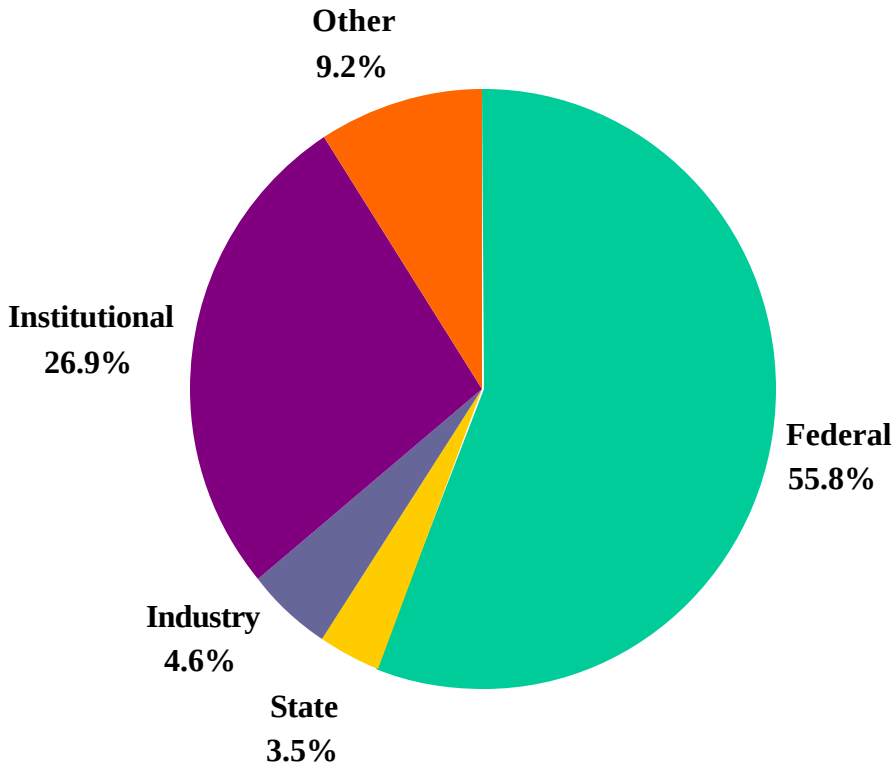
Source: NSF 1999 survey

1999 Research & Development Expenditures by Source of Funds

University of Louisville



UofL Benchmark Institutions



Institutional funds include:	External funds include:
• Institutionally financed organized research • Unreimbursed indirect costs and related sponsored research	• Federal • State and local • Industry • Other

Source: NSF 1999 survey

Revised July 19, 2001

Adjustments to Research Component of Kentucky Space Needs Model

Prepared for the

KENTUCKY COUNCIL ON POSTSECONDARY EDUCATION

Frankfort, Kentucky

May 24, 2001

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Adjustments to the Research Component Of the Kentucky Space Needs Model

Does the space needs model for Kentucky's public postsecondary institutions provide for enough research space at the doctoral universities: the University of Kentucky and the University of Louisville? If not, what changes should be made?

The Council on Postsecondary Education asked Daniel K. Paulien, president of Paulien & Associates Inc., to review the model he developed in 1999. That model was intended to gauge the need for research lab space at both doctoral and comprehensive universities. The consultant initially proposed using National Science Foundation reports, but most of the comprehensive universities do not file them. Instead, the model relied on information that all institutions supply for the Integrated Postsecondary Education Data Survey.

As UK and UofL increasingly stress research, the NSF data appears to be a more suitable guide to their needs for research space. Also, since the model was developed, both institutions have changed how they calculate institutional funds. For its purposes, the NSF allows institutions to count unreimbursed indirect overhead in addition to percentage-of-effort research dollar allocations for faculty. The result: greater increases in research dollars reported to the NSF. The consultant recommends that the council alter the model to all non-institutional R&D dollars as reported in the NSF's surveys. Such an approach acknowledges the importance of externally funded research, which should drive the model. The existing model appears to work for the comprehensive universities; no change is proposed for them.

The consultant spent a day at each of the two doctoral universities, meeting with campus officials involved with research and visiting with leading researchers (Addendum A). These meetings verified the change in the way institutional research dollars are counted for reporting to NSF. They now include percentage of effort estimates by faculty, which may go beyond directly sponsored research, and estimates of unreimbursed indirect costs (associated with externally funded R&D projects, including mandatory and voluntary cost sharing). Using NSF figures, the consultant compared the two universities and their benchmark institutions on: federal R&D dollars, state and local R&D dollars, industry R&D dollars, other non-institutional R&D dollars (primarily from foundations and healthcare organizations), and institutional dollars.

UofL and UK have relatively large amounts of space (assignable square feet) based on non-institutional R&D dollars. UofL has the most assignable square feet per $100,000 – 1,098 – among its benchmarks. UK has the highest – 779 – among its benchmarks. Another way to put the findings: The two Kentucky universities attracted relatively small amounts of outside funding for the quantity of research space they have.

The one benchmark institution with less than $50 million in non-institutional R&D had 857 assignable square feet per $100,000 of expenditures. The two benchmark institutions with between $50 million and $100 million averaged 653 assignable square feet per $100,000 of expenditures. The 16 benchmark institutions with more than $100 million averaged just under 400 per $100,000 of expenditures.

These numbers suggest that the guideline should be on the generous side at the lower levels of external, sponsored research. As the institutions acquire more non-institutional research funding, they should become more productive and show more non-institutional R&D dollars for a given amount of research space.

After testing five different formulas, the consultant recommends that 900 assignable square feet per $100,000 of non-institutional R&D expenditures, as reported in the NSF survey, be used for the first $50 million in research . For expenditures between $50 million and $100 million, 600 assignable square feet per $100,000 ought to be used. And that should be reduced to 350 assignable square feet per $100,000 for all dollars beyond $100 million. This formula was applied to 19 of the 34 benchmark institutions for UK and UofL – those for which space data was available – generating more than the existing square footage at all but three. Each of these three institutions has at least 1.2 million square feet in R&D research space and is well below the benchmark average for productivity.

Since the model is a stair step concept with all three formulas utilized for those institutions with over $100,000,000 in non-institutional research expenditures, it should be noted that for an institution at $100,000,000 the model generates an average of 750 ASF per $100,000. For an institution at $200,000,000 in research expenditures the average is 550 ASF per $100,000 and for an institution with $300,000,000 the average is 483 ASF per $100,000.

For an institution that had achieved $500,000,000 in expenditures, greater than any of the benchmark institutions currently the model would still show an average of 430 ASF per $100,000 because of the use of the much higher numbers for the first $100,000,000.

The model was based on 1999 dollars. The council should monitor inflation and adjust the model as appropriate.

The following table shows the benchmark comparison and model application as noted above.

	1999					
	Existing R & D Space in ASF	Non-Institutional R & D Dollars	Federal R & D Dollars	% Federal of Non-Institutional R & D Dollars	ASF per $100,000 Non-Institutional R & D	Proposed Model ASF using Non-Institutional R & D Dollars
University of Louisville	317,093	$28,892	$15,536	53.8%	1098	260,028
University of Kentucky	742,009	$95,226	$66,184	69.5%	779	721,356
0 - 50 Million Non-Institutional R & D Dollars						
University of Nevada-Reno	255,371	$29,785	$24,587	82.5%	857	268,065
Sub-group Average	**255,371**	**$29,785**	**$24,587**	**82.5%**	**857**	**268,065**
51 - 100 Million Non-Institutional R & D Dollars						
University of South Carolina, All Campuses	356,945	$58,338	$48,490	83.1%	612	500,028
University of Missouri, Columbia	564,388	$81,371	$53,875	66.2%	694	638,226
Sub-group Average	**460,667**	**$69,855**	**$51,183**	**73.3%**	**653**	**569,127**
Over 100 Million Non-Institutional R & D Dollars						
University of Virginia - All Campuses	603,547	$141,431	$108,495	76.7%	427	895,009
University of Iowa	790,567	$159,040	$122,638	77.1%	497	956,640
North Carolina State University at Raleigh	879,419	$195,426	$66,310	33.9%	450	1,083,991
University of Maryland at College Park	660,488	$200,720	$145,081	72.3%	329	1,102,520
University of North Carolina at Chapel Hill	627,413	$203,392	$182,935	89.9%	308	1,111,872
University of Alabama at Birmingham	623,577	$213,919	$165,223	77.2%	292	1,148,717
University of Arizona	883,221	$215,746	$178,126	82.6%	409	1,155,111
University of Florida	1,240,305	$226,728	$122,296	53.9%	547	1,193,548
University of Texas at Austin	785,434	$226,902	$164,913	72.7%	346	1,194,157
University of Pittsburgh, All Campuses	592,029	$227,074	$194,618	85.7%	261	1,194,759
University of Illinois at Urbana-Champaign	1,478,277	$251,399	$185,767	73.9%	588	1,279,897
Ohio State University, All Campuses	1,298,290	$263,400	$135,216	51.3%	493	1,321,900
University of Minnesota - All Campuses	1,507,957	$309,805	$207,761	67.1%	487	1,484,318
University of California-Los Angeles	918,843	$369,531	$251,999	68.2%	249	1,693,359
University of Michigan - All Campuses	1,536,959	$405,547	$334,226	82.4%	379	1,819,415
University of Washington - Seattle	1,217,920	$440,143	$368,112	83.6%	277	1,940,501
Sub-group Average	**977,765**	**$253,138**	**$183,357**	**72.4%**	**396**	**1,285,982**

Note A: All dollars in thousands, while all non-dollar numbers are Assignable Square Feet (ASF).
Note B: Non-institutional R & D includes Federal, State,Local,Industry,and other as reported on NSF 1999 survey.
Note C: Space data from survey conducted by University of North Carolina or Consultant calls to institutional officials.

Proposed Model:
1st $50m ratio 900 ASF per $100,000 of non-institutional R & D
next $50m ratio 600 ASF per $100,000 of non-institutional R & D
amounts > $100m ratio 350 ASF per $100,000 of non-institutional R & D

This revised model shows the University of Louisville with a space surplus of approximately 57,000 assignable square feet based on the 1999 findings. It shows the University of Kentucky with a smaller 1999 surplus of approximately 20,000. Both institutions have given the council fiscal year 2000 expenditures and projected R&D expenditures for the fiscal years 2001, 2002, 2004 and 2006. The consultant applied the model to the non-institutional funds amounts. The 2000 General Assembly approved additional research space at both universities. These amounts are added to the existing research space at the time they are expected to be completed and occupied. Two projects total slightly more than 100,000 assignable square feet at UK, and one totals about 46,000 at UofL.

The institutions have projected substantial growth in non-institutional funds from 2000 to 2006, including a more than doubling – an increase of some $30 million – at UofL, The fiscal year 2000 application of the model shows the surplus at the University of Louisville shrinking to just over 40,000 assignable square feet while the University of Kentucky shows a need for an additional 65,500 assignable square feet. UK shows a 2006 need of about 75,000 assignable square feet of additional space after absorbing the two projects authorized by the last General Assembly. The University of Louisville projects steadily increasing non-institutional funds expenditures resulting in a need of

about 167,000 assignable square feet in fiscal year 2006. This is after the authorized additional space has been included in the existing research space. The following tables show the projected findings for the University of Kentucky and the University of Louisville.

Current Fund Expenditures
For Separately Budgeted Research and Development
By Fund Source and Consistent with NSF Definitions

Institution: University of Kentucky

Source of Funds	FY 1999	FY 2000	Projected R&D Expenditures FY 2001	FY 2002	FY 2004	FY 2006
1. Federal government	$ 66,184,000	$ 73,858,000	$ 80,062,072	$ 86,787,286	$ 101,979,921	$ 119,832,118
2. State and local governments	11,297,000	19,276,000	12,000,000	12,000,000	12,000,000	12,000,000
3. Industry	15,109,000	11,213,000	11,200,000	11,760,000	12,965,400	14,294,354
4. Institution Funds:						
(i) Institutionally financed organized research	41,889,000	44,508,000	47,178,480	50,009,189	56,190,324	63,135,448
(ii) Unreimbursed indirect costs and related sponsored research	36,919,000	41,440,000	43,926,400	46,561,984	52,317,045	58,783,432
5. All other sources	2,636,000	12,097,000	2,500,000	2,500,000	2,500,000	2,500,000
Total R&D - by source of funds	**$ 174,034,000**	**$ 202,392,000**	**$ 196,866,952**	**$ 209,618,459**	**$ 237,952,690**	**$ 270,545,352**
Non-Institutional R & D Funds	$ 95,226,000	$ 116,444,000	$ 105,762,072	$ 113,047,286	$ 129,445,321	$ 148,626,472
Research & Development Assignable Square Footage						
Projected R & D ASF needs based on Model	$ 721,356	$ 807,554	$ 770,167	$ 795,666	$ 853,059	$ 920,193
Existing Research Space	742,009	742,009	742,009	742,009	757,009	846,009
Authorized Additional R & D Space				15,000	89,000	
Revised Existing Research space	742,009	742,009	742,009	757,009	846,009	846,009
Space Need or (Surplus)	(20,653)	65,545	28,158	38,657	7,050	74,184

Current Fund Expenditures
For Separately Budgeted Research and Development
By Fund Source and Consistent with NSF Definitions

Institution: University of Louisville

Source of Funds	FY 1999	FY 2000	Projected R&D Expenditures FY 2001	FY 2002	FY 2004	FY 2006
1. Federal government	$ 15,536,000	$ 17,713,000	$ 19,838,560	$ 28,800,000	$ 36,126,720	$ 45,317,358
2. State and local governments	1,144,000	1,564,000	1,798,600	2,068,390	2,735,446	3,617,627
3. Industry	6,100,000	6,532,000	6,989,240	7,478,487	8,562,120	9,802,771
4. Institution Funds:						
(i) Institutionally financed organized research	21,808,000	27,944,000	30,738,400	33,812,240	40,912,810	49,504,501
(ii) Unreimbursed indirect costs and related sponsored research	6,351,000	5,503,000	5,227,850	5,280,129	5,280,129	5,280,129
5. All other sources	6,112,000	4,806,000	4,565,700	4,611,357	4,611,357	4,611,357
Total R&D - by source of funds	**$ 57,051,000**	**$ 64,062,000**	**$ 69,158,350**	**$ 82,050,603**	**$ 98,228,582**	**$ 118,133,743**
Non-Institutional R & D Funds	$ 28.892.000	$ 30.615.000	$ 33.192.100	$ 42.958.234	$ 52.035.643	$ 63.349.113
Research & Development Assignable Square Footage						
Projected R & D ASF needs based on Model	260,028	275,535	298,729	386,624	462,214	530,095
Existing Research Space	317,093	317,093	317,093	317,093	317,093	363,185
Authorized Additional R & D Space					46,092	
Revised Existing Research space	317,093	317,093	317,093	317,093	363,185	363,185
Space Need or (Surplus)	(57,065)	(41,558)	(18,364)	69,531	99,029	166,910

The University of Kentucky and the University of Louisville both have research buildings that are 40 or more years old. Probably at the end of their useful lives without renovation, they are in the current facilities inventory as research lab space but cannot function as effectively as new space.

The consultant's goal was to create a model to show realistic space needs – and, in keeping with their benchmarks, to encourage UK and UofL to increase outside funding per square foot of research space.

Addendum A

Visits to University of Kentucky and University of Louisville
April 20 and April 21, 2001

Each campus visit started with a meeting with top academic, research and financial officials. An extensive discussion of the way in which the different lines in the NSF report are calculated and the institutional perceived needs for research space were discussed. Each institution then was invited to show the Consultant three leading research programs which were space intensive and might illustrate the needs for research space.

The University of Kentucky provided a tour and insight regarding their high-tech incubator program which includes research projects from five UK colleges. This program, called the Advanced Science and Technology Commercialization Center (ASTeCC), provides support for start up companies developing from university research.

The University of Kentucky also showed the Gluck Equine Research Center which is being expanded. Dr. Robert A. Blouin explained the importance of this research to one of Kentucky's leading business sectors.

The University of Kentucky had the Consultant meet Dr. Greg Gerhardt who was recruited from the University of Colorado Health Sciences Center and brought his existing Center for Sensor Technology to the University of Kentucky. A detailed article on Dr. Gerhardt's work entitled "Listening In On The Brain: New Technologies to Fight Neurological Disorders" is in the Spring 2000 issue of Odyssey, a publication of the University of Kentucky Vice President of Research and Graduate Studies.

The University of Louisville showed the Consultant their Lutz Microfabrication Laboratory, which is a 100 particle clean room used by faculty from five different departments. Dr. Kevin Walsh and Dr. Dale Chenoweth explained that the lab produces Micro Electric Mechanical Systems (MEMS), an advanced computer wafer application. There are only 35 such microfabrication facilities in the United States.

The University of Louisville had the Consultant meet with Roberto Bolli, M.D., of Cardiology who leads a large international team of both M.D. and Ph.D. researchers which is studying the causes of heart attacks using laboratory and computer applications and by doing intricate heart surgery on mice. Dr. Bolli was recruited from the Baylor College of Medicine. The Consultant also heard from Pei Pei Ping, Ph.D. She is a molecular and cell biologist and one of the leading scientists working in that program.

The Consultant also met with Susanne Ildstad, M.D., who brought the Institute for Cellular Therapeutics to the University of Louisville. She had been a transplant surgeon at the University of Pittsburgh and had moved her institute to Philadelphia before it was recruited by the University of Louisville. She is doing research involving bone marrow transplants that is providing greater insight into Sickle Cell Anemia. In the future, her research may help lead to cures for Diabetes and Multiple Sclerosis. Forty people were brought to the University of Louisville as part of this large research program.

Both universities also showed the Consultant some older research spaces which are in need of renovation or replacement.

Angela Martin and Sherron Jackson of the CPE staff participated in the campus visits with the Consultant.

University of Kentucky officials participating included:

Fitzgerald Bramwell, Vice President, Research and Graduate Studies
Ben Carr, Vice President, Administration
James Boling, Vice Chancellor, Research and Graduate Studies, Lexington Campus
Del Collins, Vice Chancellor, Research and Graduate Studies, Chandler Medical Center
David Watt, Executive Dean, College of Medicine
Jack Supplee, Jr., Director of Administration & Fiscal Affairs, Department of Research and Graduate Studies

University of Louisville officials participating included:

Carol Garrison, Provost

Nancy Martin, Vice President for Research
Larry Owsley, Vice President, Finance and Administration
Clarke Johnson, Assistant Vice President for Health Affairs/Director of Planning
Michael Curtin, Director, Planning and Budget